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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/919,115	08/01/2001	Wolfgang Hoenlein	32226.11	3454

7590 11/14/2003

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St. Paul, MN 55101

EXAMINER
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LISH, PETER J

ART UNIT	PAPER NUMBER
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1754

DATE MAILED: 11/14/2003

12

Please find below and/or attached an Office communication concerning this application or proceeding.

C7012

# Office Action Summary

Application No.

09/919,115

Applicant(s)

HOENLEIN ET AL.

Examiner

Peter J Lish

Art Unit

1754

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 28 August 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 11-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other:

**DETAILED ACTION**

Applicant's arguments filed 8/28/03 have been fully considered but they are not persuasive. Applicant argues that the nanotubes of Shibuta are not multi-walled nanotubes, but rather single-walled nanotubes. This is an inaccurate assumption. Single-walled nanotubes having diameters in the range taught by Shibuta, specifically up to 70 nm, are not known, due to the complex mechanism by which they are formed; rather nanotubes with diameters in this range are known to have multiple, concentric walls. Additionally, Shibuta teaches the use of nanotubes or fibrils, such as those described in US 4,663,230. It is seen from '230 that the fibrils, or nanotubes, are characterized by a substantially constant diameter between about 3.5 and 70 nanometers and multiple essentially continuous layers of ordered carbon atoms and a distinct inner core region, each of the layers and core disposed substantially concentrically about the cylindrical axis of the fibril (abstract).

***Claim Objections***

Claims 12-13, 15-17, 19-20, and 22-24 are objected to because of the following informalities: The claim dependencies are incorrectly labeled as being dependent upon canceled claims. It is assumed that the dependencies are meant to be from the new claims (with ten added to each claim number), and are examined as if so. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 11-17 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Shibuta (USPN 5,853,877).

Shibuta discloses the treatment of carbon fibrils, or multi-walled carbon nanotubes, with a particular solution comprising a strong acid containing sulfur in addition to an oxidizing agent (column 4, lines 29-35). The strong acid is preferably sulfuric acid and the oxidizing agent is preferably one having acidity in the strong acid, such as nitric acid, chromic acid, or hydrogen peroxide (column 4, line 66 – column 5, line 6). It is possible to treat the nanotubes at a temperature from room temperature to the boiling point of the acidic mixture (column 5, lines 17-18).

In treating the nanotubes as such, the surface of the nanotubes is modified by oxidation to form a polar functional group such as a carbonyl, carboxyl, nitro, etc. (column 5, lines 28-40 and Table 1). While it is not explicitly stated that only the outer wall of the nanotube is oxidized, it is equivalently stated that the surface of the nanotube is modified. Alternatively, because the treatment is performed identically to that of the applicant, it is deemed that only the outer wall of the nanotube is oxidized, especially since the acid and oxidizing agent contact the outer wall of the nanotube.

Shibuta also teaches that after the treatment, the nanotubes may be filtered, washed, and dispersed in solution, or isolated. This solution may then be used as a coating composition for the formation of an electrically conductive film by coating on a substrate (column 5, lines 41-53 and Examples 1, 4).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 18-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibuta as applied to claims 11-17 above, and further in view of Stephan et al. ("Doping Graphitic and Carbon Nanotube Structures with Boron and Nitrogen").

Shibuta teaches a process for the treatment of carbon fibrils, or nanotubes, however does not teach the use of carbon nanotubes doped with boron and nitrogen. Stephan et al. discloses the production of multiwalled carbon nanotubes having carbon atoms substitutionally replaced by boron and nitrogen atoms in various amounts. It would have been obvious to one of ordinary skill at the time of invention to perform the process of Shibuta on the nanotubes of Stephan et al., in order to disentangle and disperse the doped nanotubes and also to take advantage of the electronic properties of the BN-doped nanotubes.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

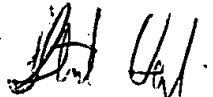
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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Lish whose telephone number is 703-308-1772. The examiner can normally be reached on 9:00-6:00 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 703-308-3837. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



PL

STUART L. HENDRICKSON  
PRIMARY EXAMINER